

IN THE SPECIFICATION

Please amend the specification as follows:

At page 7, lines 10-19, please substitute the following amended paragraph.

In one embodiment of the invention, the second tapered core segment is preferably followed distally with a manually shapable flattened core segment of about 1 to 4 cm in length which preferably has essentially constant transverse dimensions, e.g. 0.001 by 0.003 inch (0.025 by 0.076 mm). A helical coil having transverse dimensions about the same as the proximal core section is secured by its distal end to the flattened distal tip of the core member, e.g. solder, and by its proximal end at an intermediate position on the second tapered segment so that the distal end of the second tapered segment resides within the interior of the coil. The coil may have a length of about 2 to about 40 cm or more, but typically will have a length of about 2 to about 10 cm in length.

At page 10, lines 1-9, please substitute the following amended paragraph.

Another approach to generating linear stiffness change in an elongate intracorporeal involves controlling the moment of inertia at any given point in a longitudinal portion. A useful formula for such an approach is

$$I_L = \frac{CL}{E} + I_0$$

where I_L is the moment of inertia of the elongate core member at length L from a position of starting inertia to I_0 , E is the modulus of elasticity of the core material, and C is a

constant that is derived from the boundary conditions of the longitudinal portion, specifically, a desired starting moment of inertia, ~~finish~~ finished moment of inertia, length of section of linear change in stiffness.

At page 24, line 19 to page 25, line 4, please substitute the following amended paragraph.

The constant C is determined by the boundary conditions of a desired section using the equation

$$C = \frac{\pi E (D_L^4 - D_0^4)}{64 L}$$

where a desired starting diameter D_0 , ~~finish~~ finished diameter D_L , length of the section having a linear change in stiffness L , and modulus of elasticity E of the section material are inserted into the equation which is then solved for C .

At page 25, lines 5-15, please substitute the following amended paragraph.

A typical modulus of elasticity for 304 stainless steel is approximately 28×10^6 psi. An example of a set of values for a longitudinal portion 42 having features of the invention are 0.002 inches for a starting diameter D_0 , 0.013 inches for a ~~finish~~ finished or ending diameter D_L , 20 cm for the length of the longitudinal portion L , and 28×10^6 psi for the modulus of elasticity of the core member E . Solving for C yields a constant value of about 0.005 pound-inches. Another example of a set of values for a longitudinal

portion 42 having features of the invention are 0.0025 inches for a starting diameter D_0 , 0.0076 inches for a ~~finish~~ finished or ending diameter D_L , 25 cm for the length of the longitudinal portion L, and 30×10^6 psi for the modulus of elasticity of the core member E. Solving for C yields a constant value of about 0.00049 pound-inches.

At page 25, line 16 to page 26, line 7, please substitute the following amended paragraph.

Another approach for achieving a substantially linear change in stiffness in a longitudinal portion 42 of elongate core member 41 is to vary the moment of inertia along the longitudinal portion according to the formula

$$I_L = \frac{CL}{E} + I_0$$

where I_L is the moment of inertia of the elongate core member at length L from a position of starting inertia to I_0 , E is the modulus of elasticity of the core material, and C is a constant that is derived from the boundary conditions of the longitudinal portion. The constant C is determined by inserting the values of a desired starting moment of inertia I_0 , ~~finish~~ finished moment of inertia I_L , length of section of linear change in stiffness L, and modulus of elasticity E into the equation and solving for C.

At page 18, lines 11-12, please substitute the following amended paragraph.

FIG. 40B is an enlarged view of the guidewire shown in FIG. 40A within the circle ~~[[2B]]~~ 40B.

At page 19, line 18 to page 20, line 14, please substitute the following amended paragraph.

Figs 1-3 depict a guidewire 10 having features of the invention which has a core member 11 with a proximal core section 12, a distal core section 13 and a helical coil 14. The distal core section ~~[[12]]~~ 13 has a first tapered segment 15 and a second tapered core segment 16 which is distally contiguous to the first tapered core segment. The second tapered segment 16 tapers at a greater degree than the first tapered segment and this additional taper provides a much smoother transition when the distal portion of the guidewire 10 is advanced through a tortuous passageway. The degree of taper of the first tapered core segment 15, i.e. the angle between the longitudinal axis 17 and a line tangent to the first tapered core segment 15 is about 2° to about 10°, whereas the taper of the second tapered core segment 16, i.e. the angle between the longitudinal axis and the second tapered core segment is larger than the first angle and is about 5° to about 10° such as is shown in the enlarged view of the guidewire ~~[[10]]~~ in Fig. 4. While only two tapered core segments are shown in the drawings, any number of tapered core segments can be employed. Moreover, all of a multiple of tapered core segments need not have increasing degrees of tapers in distal direction. However, two or more contiguous tapered core segments over a length of about 5 to 15 cm should have distally increasing degrees of tapering.

At page 27, line 6 to page 28, line 12, please substitute the following amended paragraph.

FIG. 9 is an elevational view of a guidewire 60 having features of the invention. The guidewire 60 has an elongate core member 61 with a longitudinal portion 62 having a plurality of tapered segments 63 tapering distally to a more flexible distal segment 64. Transition points 65 are disposed between adjacent tapered segments 63. A flexible body member 66 is disposed over the distal segment 64 and the longitudinal portion 62. The flexible body 66 has a proximal end 67 and a distal end 68 with the distal end 68 of the flexible body being secured to a distal end 71 of the distal segment 64 of the elongate core member 61 with a first body of solder 72. The proximal end 67 of the body 66 is secured to the longitudinal portion 62 with a second body of solder 73. The proximal end 67 of the flexible body 66 may also be secured to any suitable portion of the elongate core member 61 or any suitable portion of the distal segment 64. In one embodiment, each tapered segment 63 of the longitudinal portion 62 has a substantially constant taper angle with the taper angle of each tapered segment being greater than the tapered segment proximally adjacent thereto. The diameter of the longitudinal portion 62 at the transition points 65, or alternatively ~~midpoints~~ midpoint 74, of the tapered segments can substantially follow the formula

$$D_L = \left[\frac{64CL}{E\pi} + D_0^4 \right]^{\frac{1}{4}}$$

where D_L is the diameter of the longitudinal portion at a transition point at length L from a position of starting diameter D_0 , E is the modulus of elasticity of the core member material, and C is a constant that is determined by the boundary conditions of the longitudinal portion. The determination of the constant C is performed in a manner similar to the determination of the constant C discussed above with regard to the embodiment of FIG. 6. The tapered segments 63 of the longitudinal portion 62 or core member 61 can be up to 10 inches in length, specifically about 0.1 to about 5 inches in length, more specifically about 0.25 to about 3 inches in length.

At page 54, lines 1-11, please substitute the following amended paragraph.

A polymer layer 253 is disposed about the distal section 233 of the elongate core member 231 and the helical coil 241. A lubricious coating 254 is optionally disposed on an outer surface 255 of the elongate core member 231 and an outer surface 256 of the polymer layer 253. The axial length and spacing of the spaced portions ~~[[24]]~~ 246 or non-spaced portions 247 of the helical coil 241 can be similar to the length and axial spacing of the radiopaque markers 225 of guidewire 200 discussed above. Excepting noted differences, the features, dimensions, materials and any variations thereof for the various elements of guidewire 230 can be generally the same as the dimensions, materials and variations thereof of similar elements of guidewire 110 discussed above.

At page 55, line 11 to page 56, line 2, please substitute the following amended paragraph.

Typically, the guidewire ~~[[230]]~~ 260 will have between about 2 to about 20 such radiopaque makers on the distal section 263. The axial length and spacing of the radiopaque bodies of solder 276 and 277 can be similar to or the same as the axial length and spacing of the radiopaque markers 225 of guidewire 200 discussed above. A polymer layer 278 is disposed about the distal section 263 of the elongate core member 261 and the helical coil 268. A lubricious coating 279 is optionally disposed on an outer surface 281 of the elongate core member 261 and an outer surface 282 of the polymer layer 278. Excepting noted differences, the features, dimensions, materials and any variations thereof for the various elements of guidewire 260 can be generally the same as the features, dimensions, materials and variations thereof of similar elements of guidewire 110 discussed above.

At page 58, line 19 to page 59, line 9, please substitute the following amended paragraph.

As shown in FIGS. 40A-41, the flexible body 316 can be made of a first polymer layer 318 disposed about the distal section 313 of the elongate core 311 and a second polymer layer 319 disposed about the first polymer layer 318. A radiopaque layer 320A is disposed between the first polymer layer 318 and the second polymer layer 319. Radiopaque layer 320A is illustrated as being intermittent in an axial direction and may

be made of a helical ribbon coil or bands of a radiopaque material. FIG. 42 illustrates another embodiment where the radiopaque layer 320B is continuous in an axial direction. Radiopaque layer 320B is sandwiched between first polymer layer 318 and second polymer layer 319. The thickness of the radiopaque layers 316C, 320A and 320B can range from about 0.0005 inch to about 0.0040 inch, preferably from about 0.0015 inch to about 0.0025 inch.

At page 59, line 10 to page 60, line 2, please substitute the following amended paragraph.

FIGS. 40A-41 illustrate an embodiment where the flexible body 316 has a radiopaque layer 320A formed of radiopaque elements 321 which are spaced apart a predetermined distance in an axial direction. The radiopaque elements 321 are preferably in the form of bands, positioned circumferentially around the elongate core 311. The radiopaque elements 321 can have a thickness from about 0.0005 inch to about 0.0040 inch, specifically from about 0.0015 inch to about 0.0025 inch. The radiopaque elements 321 can be about 0.5 to 5 mm in width, specifically 1 to 2 mm in width, and can be spaced about 0.2 to about 2 cm apart in an axial direction. The radiopaque layer 320A may be in the form of a stretched helical ribbon being open wound with turns not touching each other and the thickness of the helical ribbon can be from about 0.0005 inch to about 0.0040 inch, preferably from about 0.0015 inch to about 0.0025 inch. A helical

ribbon suitable for the radiopaque layer 320A can be about 0.5 to 2 mm wide and the turns of the helical ribbon can be about 1 to about 15 mm apart.

At page 60, lines 9-14, please substitute the following amended paragraph.

The flexible body 316 may be applied directly to the distal section ~~[[113]]~~ 313 of the elongate core member ~~[[111]]~~ 311 or they may be first formed elsewhere and then applied to the elongate core member by a suitable attachment means, preferably by adhesive or by shrink fitting. The elongate core ~~[[111]]~~ 311 member can be formed of a strong, yet flexible material, such as stainless steel, NITINOL, MP35N, L650, Elgiloy or other materials, or combinations thereof.

At page 67, line 11 to page 68, line 13, please substitute the following amended paragraph.

As thermal energy is transferred to the extrudable polymer cartridge 457, it can begin to soften or melt at a melt zone 457A. When the portion of the extrudable polymer cartridge 457 adjacent the die 431 approaches a desired temperature or viscosity or both, force in the direction of extrusion is applied to the extrudable polymer cartridge 457. This pushes the melted or softened polymer material in the melt zone 457A of the extrudable polymer cartridge 457 into the input end 432 and inner lumen 444 of the die 431 and onto the elongate intracorporeal device 412. When the force in the direction of extrusion is initiated on the extrudable polymer cartridge 457, the elongate intracorporeal

device 412 is simultaneously advanced in the direction of extrusion ~~so that~~ as the extrudable polymer cartridge 457 is heated, melted, and forced into the die 431. The melted extrudable polymer cartridge 457 is applied to the moving elongate intracorporeal device 412 in a radially inward direction as indicated by arrows 457B. As shown in FIG. 44, the extrudable polymer cartridge 457 is applied evenly at the melt zone 457A from all directions as indicated by arrows 457B. The force of this evenly distributed inward radial force helps maintain the concentricity of the polymer coating 411 if the lumen of the extrudable polymer cartridge is concentric with the longitudinal axis 464 of the extrudable polymer cartridge 457 and longitudinal axis 443 of the die 431. The coating process is carried out continuously until a desired portion of the elongate intracorporeal device 412 has been coated. The process may be terminated by exhaustion of the extrudable polymer cartridge 457, cessation of the force in the direction of extrusion on the extrudable polymer cartridge, or passage of an extremity 476 of the elongate intracorporeal device 412 through the die 431.

At page 71, line 12 to page 72, line 2, please substitute the following amended paragraph.

FIGS. 47-48C illustrate an enlarged view of the embodiment of the die 431 shown in FIGS. 44 and ~~[[46]]~~ 47. The die 431 can be made from a variety of materials, including high temperature polymers such as PI, PTFE, LCP and PEEK. The die 431 can also be made from metal or any other suitable material. The die 431 has an input end

432, an output end 433 and an inner lumen 444. An extrusion orifice 468 is disposed at an output extremity 478 of the inner lumen 444. The length 479 of the inner lumen 444 of the die 431 can vary significantly depending on the desired result and numerous other factors. A typical length of the inner lumen 444 can range from about 0.02 to about 0.5 inch, specifically about 0.05 to about 0.08 inch. A transverse dimension of the inner lumen 444 and extrusion orifice 468 of the die 431 can be from about 0.01 to about 0.25 inch, specifically about 0.011 to about 0.015 inch.

At page 75, lines 10-19, please substitute the following amended paragraph.

The guide tube housing cap 535 can be secured to the guide tube housing 501 by screws 536. The guide tube housing 501 has cooling air channels 537 disposed within the housing 501 fed by air lines 538 to allow air to be circulated about the heater member 531 and cool the heater member 531 after a polymer coating process has been completed and a new guide tube 496, die 513, extrudable polymer cartridge 516 and push tube 523 are inserted into the guide tube assembly 495. The optionally disposable components of the guide tube assembly 495 including the guide tube 496, die 513, extrudable polymer cartridge 516 and push tube 523 may be replaced separately, or all at once as a modular subassembly.